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54 **A method of making a tubular member.**

57 In a method of making a metallic shell (100) for a glow plug, a columnar blank (W) is extruded to have an enlarged recess (106) on the upper end surface of the blank (W) so as to make an upper tubular portions (104), while extruded to have an enlarged recess (107) on the lower end surface to make a first tubular end (105) circular in section, an outer diameter of which is smaller than that of the upper tubular portion (104). The blank (W) is transferred without inverting it, and the blank (W) is reduced at its upper tubular portion (104) to make a second tubular end (113) hexagonal in section, an outer diameter of which is smaller than that of a middle portion (112) of the blank (W), but greater than that of the first tubular end (109). Then, the blank (W) is transferred without inverting it, and

punched to communicate the first tubular end with the second tubular end by means of an axial bore (116). In other method, a mandrel (65a) is forced into the upper tubular portion (108) to form a second tubular end (113) hexagonal in section, an outer diameter of which is smaller than that of a middle portion of the blank (W), but greater than that of the first tubular end. In the forcing process, a cooling liquid oil (Cm) is supplied between the upper tubular portion (108) of the blank (W) and the mandrel (65a) to alleviate friction heat, the cooling liquid oil (Cm) flowing down between the upper tubular portion (108) of the blank (W) and the mandrel (65a) is led to the axial bore (116) as an escape path of the liquid oil (Cm).

Fig. 18

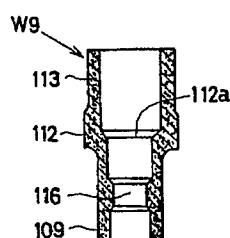
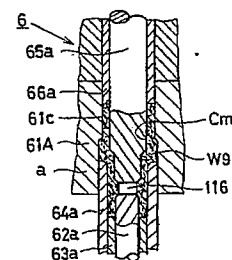


Fig. 21



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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X,A	GB-A-9 760 87 (NATIONAL MACHINERY COMPANY) * page 13, line 123 - page 14, line 118; figures * - - - -	1,2,8,10, 3,4,7,9	B 21 K 21/08 H 01 T 21/02
A	DE-C-9 598 76 (ROBERT BOSCH GMBH) * page 2, lines 50 - 93; figures * - - - -	1-4,8-10	
A	US-A-4 312 210 (KOBE STEEL LTD) * column 7, lines 5 - 47; figures 6, 12 * - - - -	3,5	
A	SOVIET INVENTIONS ILLUSTRATED Week 8201, 17 February 1982 Derwent Publications Ltd., London GB & SU-A-816658 (UFA AVIATION INST) 3 May 1979 - - - -	3,5	
A	GB-A-8 741 67 (TEXTRON INC.) * page 3, lines 100 - 112; figure 6 * - - - - -	5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 21 K H 01 T
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		11 June 91	BARROW J.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention</p> <p>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons</p> <p>&: member of the same patent family, corresponding document</p>			